Professional Roofing

What roof system would you install?

Members of NRCA's technical committees explain their roof system choices

by Ambika Puniani

Although some buildings may lend themselves to certain roof system applications more than others, most roofing contractors will say there are several ways a building can best be roofed. To test that theory, *Professional Roofing* asked members of NRCA's various technical committees to provide their opinions about how they would roof a specific fictional building.

The characteristics of the fictional building the contractors were asked to roof follow:

- It is located in the central Midwest.
- It is a new construction project with open access.
- It is a four-story commercial, multipurpose facility.
- It has a combination of masonry and metal exterior walls and low-slope roof areas with metal and poured concrete decks with interior drainage (metal sloped a minimum of 1/8-in-12 [0.6 degree], and concrete sloped close to dead level).
- It has steep-slope roof areas with a steel deck and eave edge drainage.
- Deck areas vary from 40 squares to 300 squares (360 m^2 to 2700 m^2) for low-slope roof areas and 20 squares to 100 squares (180 m^2 to 900 m^2) for steep-slope roof areas.

Contractors were asked to explain their choices in the context of experienced performance attributes and local geographic conditions, not necessarily lowest cost.

The following contractors contributed to this article: Low-slope Roofing Committee Chairman Bob Daly, president of Kaw Roofing & Sheet Metal, Kansas City, Kan.; Low-slope Roofing Committee Member Tom Dessent, secretary of corporation—estimator and sales for Dessent Roofing Co. Inc., Chicago. Steep-slope Roofing Committee Chairman Jim Eckstein, president of C.A. Eckstein Inc., Cincinnati, Architectural Sheet Metal and Metal Roofing Committee Chairman Will Fort III, president of Fort Roofing & Sheet Metal Works Inc., Sumter, S.C.; Low-slope Roofing Committee Member Chris Jurin, vice president of Jurin Roofing Services Inc., Quakertown, Pa.; and Spray Polyurethane Foam-based Roofing Committee Member Michael Lanouette, Urethane Roofing Division manager for F.J. Dahill Co. Inc., New Haven, Conn.

Each of these contractors' companies specializes in a particular roof system or installs significant amounts of a particular roof system. Following are their recommendations.

Bob Daly

"The advantage of being part of an 80-year-old company is seeing roof systems come and go. And the one roof system that has survived the onslaught of competition is built-up. For decades, it also has survived the elements.

"I often am asked which roof system I would put on my building. Each time I answer the question, I say—without hesitation—coal-tar pitch. In my opinion, there has been no other roof system to date that will outperform a built-up roof (BUR) system using coal-tar pitch. I once had a competitor tell me he did not like coal-tar-pitch roof systems because they cost too much *and* last too long. God forbid contractors would want to install roof systems that last *too long*.

"The building in question is in a part of the country I happen to be very familiar with. Its potential for extreme heat and cold creates a perfect setting for the use of a coal-tar-pitch BUR system. The self-healing characteristics of coal-tar pitch allow hot summers to remedy the effects of cold winters.

"Because the building is new construction, fears of fumes affecting building occupants are alleviated. And it has open access to accommodate the use of a kettle at whatever level the roofing process is taking place. Even at four stories, pitch easily can be pumped up to the roof surface. The fact that this is a commercial building should make pitch an easy sale on the basis of cost per year of service.

"The building description indicates a slope ranging from 1/8-in-12 (0.6 degree) to dead level. Working with minimal to no slope makes coal-tar pitch one of the few—if not only—candidates for the job. During my lifetime, coal-tar pitch has outperformed all other systems under these conditions and, in most cases, is warrantable under ponded water.

"In 1935, the first generation of my company installed a coal-tar-pitch roof system on a local school. Eight years ago, the third generation tore it off. Is 59 years *too long*? The school district didn't think so.

"When choosing a roof system for a steep-slope application in this part of the country, I used to look at performance first and aesthetics second because of the limitations of combining both. That was until metal roof systems came of age. In steep-slope commercial situations, I

recommend metal roof systems 99 percent of the time.

"When it comes to wind-uplift ratings, fire resistance, hail resistance, longevity, reflectivity and algae resistance, metal leaves little to dislike. If you don't like the standing-seam look, you can have the look of shingles, tile or slate while still using metal.

"The life-cycle cost of a metal roof system combined with that of a coal-tar-pitch BUR system will give this owner the best roof system money can buy."

Tom Dessent

"Given the choice to pick a roof system for this type of construction, I would want to install a granule-surfaced modified bitumen roof system But I will give an alternative option for installing a BUR system.

"On the concrete deck sections, I would install a two-ply fiberglass vapor retarder followed by a tapered polyisocyanurate insulation system (2-inch [51-mm] minimum at 1/4-in-12 [1 2-degree] slope) mopped in hot asphalt with a 1/2-inch (12.7-mm) fiberboard overlay.

"My choice for a hybrid system would be a three-ply Type VI fiberglass felt mopped in asphalt and covered with a torch-applied APP-modified bitumen granule-surfaced roof membrane.

"On the metal deck sections, I would mechanically fasten 1-inch- (25.4-mm-) thick perlite insulation followed by a two-ply fiberglass vapor retarder. I then would mop a tapered polyisocyanurate insulation board (2-inch [51-mm] minimum, 1/8-in-12 [0.6-degree] slope) in hot asphalt This would give the system a 1/4-in-12 (1.2-degree) slope because the deck had a 1/8-in-12 (0.6-degree) slope and 1/2-inch (12 7-mm) wood fiberboard. Next, I would apply three-ply Type VI fiberglass felt mopped in hot asphalt followed by a torch-applied APP-modified bitumen granule-coated roof membrane.

"All flashings would be counterflashed with 24-gauge prefinished steel.

"I also would offer an option for using 2-inch- (51-mm-) thick insulation with a 1/2-inch (12.7-mm) overlay and four-ply tarred glass and gravel.

"For the steep-slope section, I would mechanically attach a 2 1/2-inch (63 5-mm) nail base to the deck Then, I would apply an underlayment over the entire surface and install a standing-seam metal roof system with gutters and fascia."

Jim Eckstein

"For the low-slope areas, I would add 1/8-in-12 (0.6-degree) tapered polyisocyanurate insulation over a 2-inch- (51-mm-) thick base layer of polyisocyanurate on the metal deck areas to achieve a 1/4-in-12 (1.2-degree) slope. Then, I would install 1/2-inch- (12.7-mm-) thick high-density fiberboard over tapered polyisocyanurate insulation and mechanically fasten it to meet FM 1-90 requirements. I would make sure seams in the 1/2-inch- (12.7-mm-) thick cover board are offset from underlying insulation seams.

"I would install 1/4-in-12 (1.2-degree) tapered polyisocyanurate insulation over the concrete deck set in hot asphalt after the deck has been primed with asphalt primer. I then would install 1/2-inch- (12.7-mm-) thick high-density fiberboard over tapered polyisocyanurate insulation in hot asphalt I would make sure seams in the 1/2-inch (12.7-mm-) thick cover board are offset from underlying insulation seams t then would completely adhere a 60-mil- (1.5-mm-) thick fire-rated EPDM sheet.

"For the steep-slope areas, I would mechanically attach—per manufacturer's recommendations—a composite vented nail base insulation over a metal deck. I then would install an underlayment at eave edges and extend it to 24 inches (610 mm) inside the interior wall. Next, I would install No 30 felt on the remaining steep-slope area and either an asphalt shingle or standing-seam metal roof system."

Will Fort

"For areas above the metal deck, I would mechanically attach a base layer of polyisocyanurate insulation according to applicable FM Global requirements. Then, I would install 1/8-in-12 (0.6-degree) tapered perlite roof insulation, sloped to interior drains, to provide a net slope of 1/4-in-12 (1.2 degree). Next, I would install three plies of Type IV or Type VI fiberglass felt and a fire-rated SBS-modified bitumen cap sheet. If money is not a concern, I would install a fourth ply of felt with a gravel surface.

"For areas above the concrete deck, I would prime the deck and install 1/4-in-12 (1.2-degree) tapered perlite roof insulation sloped to interior drains. All else would be the same as that above the metal deck area.

"For the sleep-slope areas, I first would mechanically attach a layer of 1/2- or 5/8-inch- (12.7- or 15.9-mm-) thick siliconized gypsum board to the steel deck. Then, I would install a continuous layer of underlayment over the siliconized gypsum board. This will provide secondary protection and quick dry-in for building construction. Next, I would furnish and install a 16-inch- (406-mm-) wide architectural standing-seam metal roof system complete with all trim."

Chris Jurin

"In choosing a roof system for this building, there are several options available. A selection depends on the facility's intended use, as well as the intended aesthetic appearance. Selecting a roof system based on aesthetic appearance more closely affects the steep-slope applications than the low-slope applications.

"Before roof system installation, I would confirm the roof system design complies with local building codes, determine whether FM Global requirements apply; confirm the roof deck is suitable to receive the designed roof system; and make sure all other trades responsible for related materials complete work before beginning the roofing project

"Because the steep-slope applications are being installed over a steel deck, I assume an insulation board will be required to create a flush

surface to support the application of roofing materials. In this situation, I recommend installing a ventilated composite board that will provide the nailable surface needed to attach the roof system. The attachment method depends on whether the deck's underside is visible from the building's interior. If the deck is visible, a nonpenetrating attachment method, such as low-rise foam, may be used. If the underside is not visible, mechanically attaching the insulation board may be permissible.

"After installing the insulation board, a heavy-grade architectural shingle or standing-seam metal roof system should be installed. The system would be upgraded to ensure proper wind-uplift resistance depending on the building's height. If the roof system ties into the low-slope roof areas, proper termination points will be provided between the assemblies to ensure a clear division for warranty purposes.

"For the low-slope portions, the general contractor constructed the building in such a way that the slope required to drain water from the roof system is built into the structure. As a result, the insulation needed to create a flush surface and desired R-value can be flat. I would recommend a minimum of 2-inch- (51-mm-) thick polyisocyanurate insulation be installed over the deck. After installing the base layer, tapered insulation should be added in specific areas to enhance drainage patterns and minimize the possibility of ponded water. Finally, a cover board should be installed over the insulation system and all layers should be simultaneously mechanically fastened to the steel deck.

"The other portion of the low-slope areas consists of a poured concrete roof deck with no slope built into the roof deck. Because of the presence of poured concrete, the deck assembly may have moisture in it. To provide proper ventilation for the roof deck, I first would mechanically attach a ventilated base sheet to the roof deck. Afterward, tapered insulation would be installed to provide proper drainage. The tapered insulation would be adhered to the ventilated base sheet with low-rise urethane foam. Finally, a cover board would be installed over the entire roof area. The cover board would be set in a continuous application of low-rise urethane foam, as well.

"After the insulation installation, all low-slope areas would receive a fully adhered, fire-rated, 60-mil- (1.5-mm-) thick EPDM roof system. Also, in areas where the roofing materials are installed over the poured concrete deck, one-way breather vents will be installed to allow for proper ventilation of moisture.

"There are short-term benefits to choosing a fully adhered EPDM roof system. Such a roof system provides increased puncture resistance, which is important in new construction because of the abuse most roof membranes take from other trades during a building's construction. Second, this system requires minimal installation time. Third, the dead load this roof system will add to the building is minimal. As a result, a building owner will reduce the construction cost of the building because the structural capacity will not need to be enhanced to handle the additional weight of either a ballasted or BUR system.

"In addition, a fully adhered system resists the effects of ponded water better than asphalt-based roof systems. Most quality roof systems are designed to provide positive drainage. However, because of building movement and other outside forces, ponded water conditions inadvertently may develop during a roof system's life. An EPDM roof system also will withstand building movement better than other roof systems because of the product's elasticity. Finally, an EPDM roof system will provide long-term protection against wind uplift."

Michael Lanouette

"I would install a spray polyurethane foam (SPF) roof system for a number of reasons. For example, SPF is conducive to low- and steep-slope areas. In addition, low-slope areas easily can be sloped to drains and steep-slope areas can be tied-in to low-slope areas more easily if required.

"My recommendation for the scope of work would be as follows:

- All concrete decks would be primed, and a base sheet would be hot-mopped.
- All low-slope metal deck areas would have a 5/8-inch- (15.9-mm-) thick layer of siliconized gypsum board mechanically fastened with a hot-mopped base sheet.
- All steep-slope metal deck sections would have a 5/8-inch- (15.9-mm-) thick layer of mechanically fastened siliconized gypsum board.
- All wood blocking and metal fascia would be installed according to standard specifications.

"Once the previously mentioned work is completed, a 1 1/2-inch- (38.1-mm-) thick SPF base layer would be installed on all roof surfaces and coated with a urethane base coat. This would allow for phasing and other trades to perform their respective work.

"After other tradespeople have completed their work, the urethane-coated surface would be properly cleaned by power washing and one or more layers of SPF would be applied, bringing the system into compliance with applicable building codes and specifications.

"Over the cured SPF, a base coat of urethane coating would be applied and allowed to cure. Over the cured base coat, a silicone top coat would be applied and embedded with fine aggregate. Approved walk pads would be installed around all rooftop equipment units and on common walk paths.

"I would choose SPF not only because of its versatility on low- and steep-slope areas but also because it allows a contractor to provide temporary protection and phasing that is required for a typical new construction project. I also would select a urethane base coat and silicone top coat because I believe they provide a hybrid system that offers the toughness of urethane and superior weatherability of silicone. This system also can be renewed, or resurfaced, in the future."

What about you?

The contractors who participated in this article offer varied approaches to the same question: What is the best way to roof a typical building? And *Professional Roofing* would like to hear your opinions, as well.

E-mail your suggested approach to professionalroofing@professional-roofing.net or mail it to *Professional Roofing*, 10255 W. Higgins Road, Suite 600, Rosemont, IL 60018. We'll compile readers' responses and post them on www.professionalroofing.net.

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